

ANSWERS: Crystal Ball questions on Explaining Equilibrium

All of the following questions have not (as yet!) appeared in the NCEA Level 1 Exams

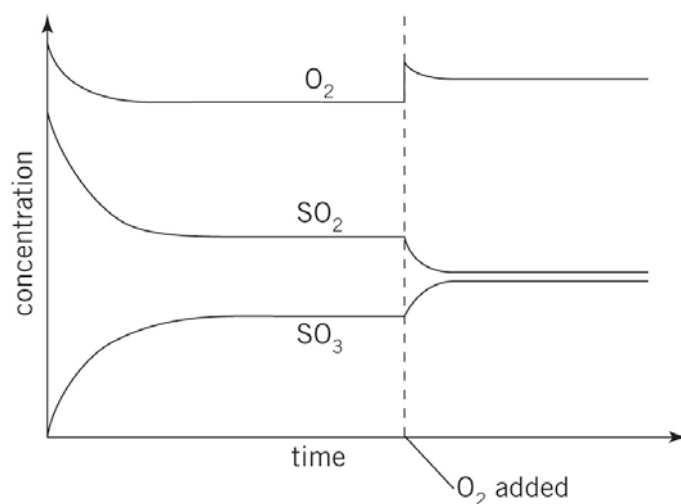
- 1i) right/forward, conc of B_2H_6 increases
- ii) right/forward, conc of B_2H_6 increases
- iii) right/forward, conc of B_2H_6 increases

2) i) This is an exothermic reaction because an increase in temperature favours endothermic/reverse reaction because the yield of ammonia decreases with increasing temperature

ii) an increase in pressure favours the reaction which has fewer moles of gaseous products so equilibrium moves to the right therefore the yield of ammonia increases

iii) the rate increases because there is an increase in energy of the particles and an increase in the frequency of collisions, because of the increased energy of the particles it is more likely that the collisions will be successful collisions.

3)



4) less product is present at higher temperatures, therefore the forward reaction is exothermic;

5) i) The reaction reaches equilibrium four times, as this is the number of occasions that the concentrations of all three species remain unchanged for a period of time.

ii) At the 10-minute mark a quantity of $COCl_2$ was added, as its concentration increased virtually instantaneously.

iii) Over this period of time the concentrations of CO and Cl_2 were increasing and that of $COCl_2$ was decreasing, so the reaction was proceeding to the left (backwards).

iv)
$$K_c = \frac{[COCl_2]}{[CO][Cl_2]} \text{ mol}^{-1} \text{ dm}^3$$

v) At the 30-minute mark the concentrations of all three species decreased almost instantaneously. To achieve this, either a valve was opened to release some gases or the volume of the vessel was increased.